Remarks/Arguments

The claims are 1-7. Claim 1 has been amended to better define the invention, and claims 2-7 have been amended in view of the amendment to claim 1. Reconsideration is expressly requested.

In the Advisory Action dated October 2, 2007, the Examiner indicated that Applicants' Response to Final Office Action filed September 19, 2007 did not place the case in condition for allowance because in the Examiner's view:

(1) *Villeneuve et al. U.S. Patent No. 6,130,969* describes division of power as shown in the figure of page 5 of the September 19, 2007 Response to Final Office Action where the power entering the prior art device is divided and leaves separate via the Transmission and Forward Drop guides, and

(2) the current claim language did not preclude a cavity between the waveguides and therefore the argument that *Villeneuve et al.* requires a cavity between the bus and drop guides need not be considered by the Examiner.

Accordingly, the Examiner maintained the rejection under 35 U.S.C. 103(a) of the claims as being unpatentable over *Villeneuve*

et al. for the reasons set forth on pages 3-4 of the July 10, 2007 Office Action.

In response, Applicants have amended claim 1 to preclude a cavity between the waveguides as suggested by the Examiner and respectfully traverse the Examiner's rejection for the following reasons.

As set forth in claim 1 as amended, Applicants' invention provides a method of dividing a guided electromagnetic signal including the step of exciting a coupler made by two parallel coupled cavity waveguides close to one another, implemented in a photonic crystal. The two coupled cavity waveguides can be suitably curved and are physically separated without any cavities provided between the cavity waveguides. The method divides a guided electromagnetic input signal into two output half-power signals that travel the same physical path without delay between the two.

In this way, Applicants' invention provides a method of dividing a guided electromagnetic signal which permits the size of the divider structure to be considerably reduced, thereby making it suitable for integration with several divider units as functional units of more complex devices. In addition, the large bandwidth

and synchronization of the two output signals of the structure allows high-speed signal processing.

In contrast to the high-efficiency channel extractor filter which *Villeneuve et al.* relates to, in Applicant's method as recited in claim 1 as amended there is no cavity between the bus and the drop guides. Rather these guides converge together in order to be able to couple and to bring about the division of power phenomenon as recited in Applicants' claim 1 as amended. Unlike *Villeneuve et al.,* Applicants' method as recited in claim 1 as amended is not based on a resonant phenomenon (there is no cavity although the guides are composed of coupled cavities) and therefore the division of power is produced over a wide bandwidth as may be seen in FIG. 11 of Applicants' disclosure. Because *Villeneuve et al.'s* filter is based on a resonant phenomenon, *Villeneuve et al.'s* filter is narrow-band.

In effect, in *Villeneuve et al.'s* filter the bus and drop guides may be curved, but a resonant cavity between the tubes is absolutely essential so they are not directly coupled. In Applicants' method as recited in claim 1 as amended, a cavity must not be present between the two guides, and the guides are coupled over a small section, which may be curved to give rise to the phenomenon which makes the division of power possible.

Thus, Applicants' method as recited in claim 1 as amended is based on a different physical phenomenon in which there is no cavity between two uncoupled guides, and which has two guides which couple in a small spatial region. In addition, different performances are presented. In Applicants' method as recited in claim 1 as amended, there is a 50/50 power divider for a wide frequency band. In contrast, *Villeneuve et al.'s* filter completely extracts a frequency from a particular band and does not divide a guided electromagnetic input signal into two output half-power signals that travel the same physical path without delay between the two within the meaning of Applicants' claim 1 as amended.

Thus, *Villeneuve et al.'s* filter fails to disclose or suggest how to divide a signal into two signals by means of exciting a coupler made by two parallel coupled cavity waveguides close to one another in which the two coupled cavity waveguides are physically separated without any cavities provided between the cavity waveguides. Rather, *Villeneuve et al.* discloses how to extract an f_3 frequency signal from an input guide to an output guide (leaving the other signals with frequencies different from f_3 at the input guide) by means of the use of a resonant cavity.

Accordingly, for these reasons and for the reasons set forth in Applicants' Response to Final Office Action filed September 19,

2007, a copy of which is enclosed herewith, it is respectfully submitted that claim 1 as amended is patentable over *Villeneuve et al.* together with claims 2-7, which depend directly or indirectly thereon.

In summary, claims 1-7 have been amended. In view of the foregoing, it is respectfully requested that the claims be allowed and that this case be passed to issued.

Respectfully submitted,
Javier MARTI SENDRA ET AL.

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Frederick J. Dorchak, Reg. No.29,298
Attorney for Applicants

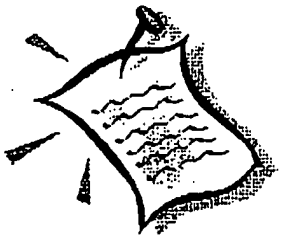
FJD:cmm

Enclosure: Copy of Petition for three-month extension of time

EXPRESS MAIL NO. EM 184 377 423 US
Date of Deposit: December 24, 2007

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10, on the date indicated above, and is addressed to Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Amy Klein



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DATE: September 19, 2007

NO. OF PAGES INCLUDING COVER PAGE: 8

TO: Examiner: J. T. Rahll

FAX NO.: 571-273-8300

FROM: Frederick J. Dorchak
Reg. No. 29,298

RE: U.S. Serial No. 10/568,363
Applicants: Javier Marti Sendra et al. - 1 PCT
(Our Reference: MARTI SENDRA ET AL. - 1 PCT)

If you do not receive all of the pages, please call the above phone number as soon as possible.

MESSAGE:

Enclosed please find an Amendment in Response to final Office Action.

Sincerely,
Collard & Roe, P.C.

Frederick J. Dorchak
Reg. No. 29,298

Encl.
djp

RESPONSE UNDER 37 C.F.R. 1.116
EXPEDITED PROCEDURE
EXAMINING GROUP 2874

PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Javier MARTI SENDRA ET AL. - 1 PCT		
SERIAL NO.:	10/568,363	EXAMINER:	J. T. RAHLL
FILED:	MARCH 24, 2006	GROUP:	2874
TITLE:	METHOD OF DIVIDING A GUIDED ELECTROMAGNETIC SIGNAL INTO TWO HALF-POWER SIGNALS USING PHOTONIC CRYSTALS		

RESPONSE TO FINAL OFFICE ACTION

MAIL STOP AF
Honorable Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action dated July 10, 2007, Applicants respectfully request reconsideration on the basis of the following:

Remarks/Arguments which begin on page 2 of this paper.

REMARKS/ARGUMENTS

The claims are 1-7, which have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. *6,130,969 to Villeneuve et al.* for the reasons set forth on pages 3-4 of the Office Action, which essentially repeat the rejection made in the previous Office Action dated January 17, 2007. The Examiner has also taken the position that when frequencies are divided in *Villenueve et al.*, there is inherently a division of power to each of the resulting signals, and therefore, even though the device of *Villenueve et al.* is not primarily used as a power divider, it functions in such a way that it does provide power between two resulting optical signals.

This rejection is respectfully traversed and reconsideration is expressly requested.

As can be seen from its title, *Villenueve et al.* relates to a high-efficiency channel extractor filter. As shown in FIG. 1, the operation of *Villenueve et al.'s* structure is such that an f_i frequency channel is extracted via the drop port (which may be

backward or forward) in its entirety, without any of the power in the f_3 frequency signal exiting via the transmission port. This operation is achieved by means of the insertion of a photonic crystal cavity (which will therefore have a narrow-band frequency response) between the bus and drop guides. It is respectfully submitted that there is no division of power at any point in the structure, which operates exclusively as a filter (in order to extract the f_3 frequency channel). That the extraction of power from the f_3 frequency channel is total (see FIGS. 15A-15C and col. 12, lines 40-55 of *Villenueve et al.*) is physically ordained by the existence of two degenerate modes (odd- and even-) in the cavity.

In Applicants' method as recited in claim 1, no filtration phenomenon is produced. In the event of applying the multifrequency signal f_1, f_2 and f_3 (see FIG. 1 of *Villenueve et al.*) to Applicants' method, the result would be that the transmission and forward drop output ports would have the same multifrequency signal f_1, f_2 and f_3, but with a power which is half that of the input port, and with a phase relationship which can be of 0° or 90°, depending on the mode excited in the

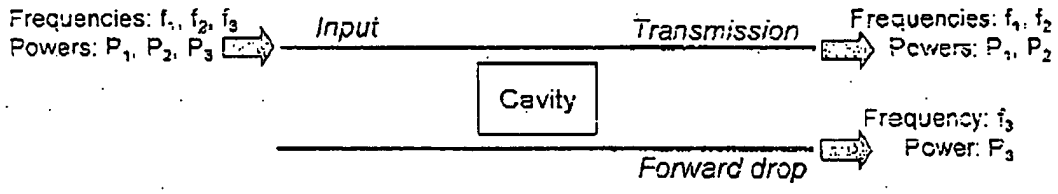
coupling region. This result arises because with Applicants' method as recited in claim 1, there is no cavity between the bus and drop guides, as there is in *Villenueve et al.'s* filter; rather these guides converge together in order to be able to couple and to bring about the division of power phenomenon as recited in claim 1. Applicants' method as recited in claim 1 is not based on a resonant phenomenon (there is no cavity, although the guides are composed of coupled cavities) and therefore the division of power is produced over a wide bandwidth, as may be seen in FIG. 11 of Applicants' disclosure. Conversely, *Villenueve et al.'s* filter is based on a resonant phenomenon, and is therefore narrow-band.

In effect, in *Villenueve et al.'s* filter the bus and drop guides may be curved, but a resonant cavity between the two is always absolutely essential, so they are not directly coupled. In Applicants' method as recited in claim 1, a cavity must not be present between the two guides, and the guides are coupled over a small section, which may be curved, to give rise to the phenomenon which makes the division of power possible.

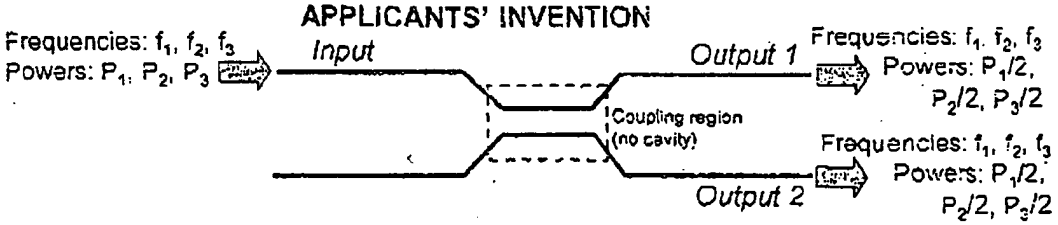
All these differences between *Villenueve et al.'s* filter and Applicants' method as recited in claim 1 may be observed

schematically in the figure below, where it is considered that the extraction occurs only via the forward drop port of *Villenueve et al.* device, although the same consideration would apply in the case of output via the backward drop port.

PATENT 6,130,969



APPLICANTS' INVENTION



Therefore, it is respectfully submitted that *Villenueve et al.* fails to disclose or suggest Applicants' method as recited in claim 1 as

- Applicants' method as recited in claim 1 is based on a different physical phenomenon in which there is no cavity between two uncoupled guides, and which has two guides which couple in a small spatial region; and

- Different performances are presented: In Applicants' method as recited in claim 1, there is a 50/50 power divider for a wide frequency band; in contrast, *Villenueve et al.'s* filter completely extracts a frequency from a particular band and does not bring about any division of power.

For these reasons, it is respectfully submitted that the Examiner's position set forth at point 6 of the Office Action is incorrect. Contrary to the Examiner's position, *Villenueve et al.'s* filter fails to disclose or suggest how to divide a signal into two signals by means of exciting a coupler. Rather, *Villenueve et al.* describes how to extract an f_3 frequency signal from an input guide to an output guide (leaving the other signals with frequencies different from f_3 at the input guide) by means of the use of a resonant cavity.

It is respectfully submitted there is no power division phenomenon in the structure disclosed in *Villenueve et al.'s* patent. In order for such a power division to be present, the power of the signal at frequency f_3 would have to be split between the output guides, which is not the case, as the totality of the power is transmitted to the forward or backward drop

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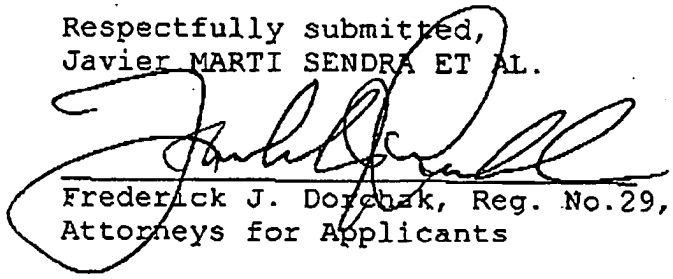
guides in *Villenueve et al.'s* filter. It is respectfully submitted that in no way can the structure disclosed by *Villenueve et al.* operate as a divider, as the Examiner states, but rather only as a filter, *Villenueve et al.*'s filter being an optical device which is totally different from a divider.

Accordingly, it is respectfully submitted that claim 1 is patentable over *Villenueve et al.* together with claims 2-7, which depend thereon.

In view of the foregoing, withdrawal of the final action and allowance of this application are respectfully requested.

Respectfully submitted,
Javier MARTI SENDRA ET AL.



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Fax No. 571-273-8300

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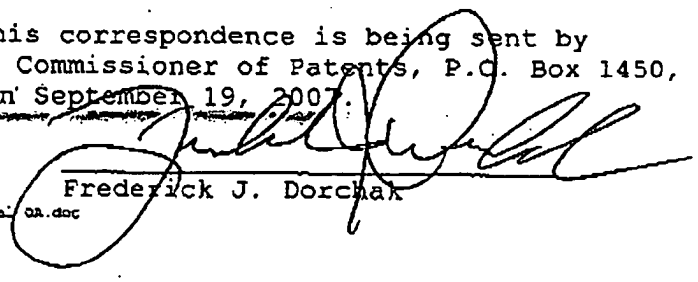

Frederick J. Dorchak

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